

The butcher, the baker,  
the candlestick maker—  
that seems to be the answer  
to the question...

## Who Eats Shrimp?

Citizens of the United States ate over 400 million pounds of shrimp in 1972.

What sort of people were they? Were they young, old; rich, poor; residents of the coastal states or of the mountains and plains?

Some clues can be found in a publication issued by NMFS in 1971. It is "Regional and other related aspects of shellfish consumption: some preliminary findings from the 1969 consumer panel survey," by NMFS staff members Morton M. Miller and Darrel A. Nash. Their report was issued as Circular 361 in June, 1971. The original edition is, unfortunately, out of print, but reproduced copies can be obtained from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22151, either in microfiche or hard-copy form. The original data upon which the paper was based appeared as NMFS Data Reports 58, 59, 60, 61, and 62, also published in 1971. They also are available from NTIS.

The data were collected by a market-survey firm under contract with NMFS.

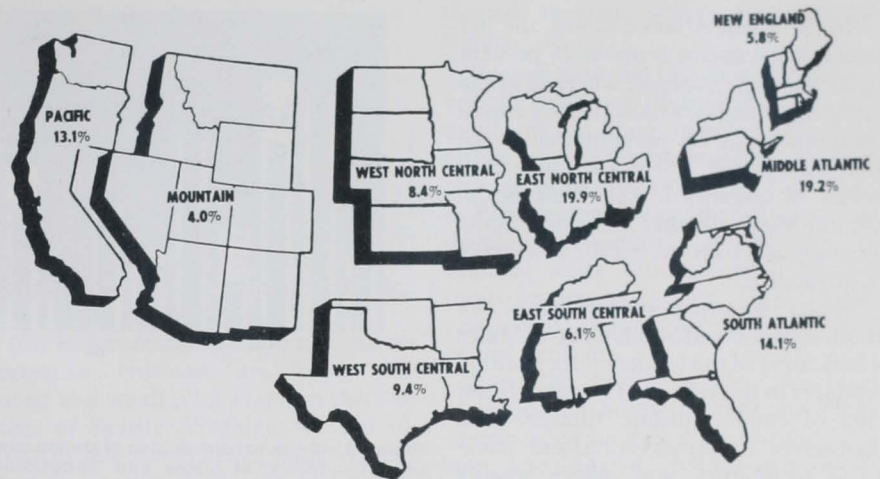


Figure 2.—Geographical divisions used in consumer panel survey. The divisions are those used by the Department of Commerce, Bureau of the Census. The percentages are those of the survey sample. (From Miller and Nash, Appendix 1.)

About 1,500 households across the land were enlisted to log the details of their seafood purchases for a 12-month period, February 1969 to January 1970. The families were carefully chosen to reflect in age, economic status, and other characteristics the whole U.S. population.

"The survey panel may be considered closely representative of the populations of U.S. households with respect to the significant demographic variables," say Miller and Nash. "Household surveys, however, are particularly vulnerable to nonsampling errors arising from unavoidable biases in the questionnaire and in the memories of the respondents."

### SHRIMP—KING OF SHELLFISH

It is obvious from the data that shrimp is widely popular in the United States. Members of the survey panel ate a little more shrimp at home than they did of all other shellfish combined (see Figure 1).

### REGIONAL PATTERNS

Although the study as a whole dealt with a variety of seafoods, in their Circular Miller and Nash confined themselves to shellfish purchases. Using the geographical division of the Bureau of

the Census (see Figure 2), they found that shrimp products, marketed mostly frozen, have a fairly even distribution among the regions of the United States, although the bulk of the U.S. shrimp catch is, of course, taken in the Gulf states. The U.S. per capita at-home consumption of shrimp was slightly under a pound.

The per capita at-home consumption for the nine regions is shown in Figure 3. Curiously, considering their distance from the ocean, the Mountain States rank highest, though only by hundredths of a pound. And only the West North Central states (the Dakotas, Wisconsin, etc.) ate less than half a pound per capita.

"With a single exception," say Miller and Nash, "no region's per capita consumption of shrimp eaten at home varies more than 32 percent from the national average (see Figure 3). Four regions are above average in per capita consumption; one is approximately average; and four are below average.

"The Middle Atlantic States account for 24 percent of the total at-home consumption and rank first in this respect. Per capita consumption in the Middle Atlantic States is about 29 percent above the national average. The South Atlantic States follow in total consumption with 19 percent of the total, and the East North Central States are third with 15 percent of the total.

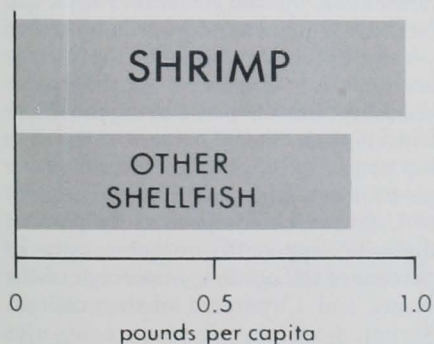


Figure 1.—Survey panel members consumed more shrimp per capita than they did of all other shellfish combined. The figures (from Miller and Nash, Appendix 2) are: Shrimp, 0.976 pound per capita; oysters, 0.210; crabs, 0.166; lobster, 0.167; lobster tails, 0.134; clams, 0.074; scallops, 0.085; and others, 0.008.



"In the South Atlantic States, the per capita consumption is about 28 percent above the U.S. average, whereas in the East North Central States the per capita consumption is 26 percent below the national average. Shrimp are also consumed in quantity in the West South Central States. In that area, per capita consumption tops the national average by 30 percent.

"Heavy shrimp consumption in the South Atlantic and South Central States is indicative of the tendency for seafood products to be consumed largely in their area of catch. Shrimp, though, lend themselves to preservation and packaging techniques that assure quality maintenance in long-distance shipping. Thus, there is an effective nationwide marketing network for shrimp products. The Mountain area States, for example, have a high per capita rate of consumption, although they are located at relatively long distances from the producing areas.

"The universality of shrimp consumption indicates little need for concentrated market development strategies. By the same token, the firmly entrenched competitive position of shrimp throughout the regions of the United States is a factor to be taken into account in the marketing of other seafoods. In any event, the geographic distribution pattern of shrimp consumption illustrates the favorable possibilities for seafoods that are suitably processed and packaged to undergo long-distance distribution."

## CONSUMPTION AND INCOME

The survey showed that on the whole the better-off households ate more shellfish per capita. "Consumer panel households in the \$10,000 plus income bracket, for example, consumed 38 percent of the shrimp tallied in the survey, although the group comprised only 31 percent of the total number of households. Similarly, the upper income group consumed well above their proportional share of other shellfish, with the exception of oysters. Apparently the income-consumption relationship for oysters is the reverse of what was observed for other shellfish. About 48 percent of the oysters were consumed in survey households with incomes under \$7,000; this group made up 44 percent of the total

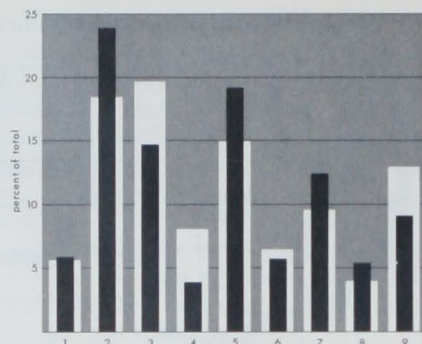


Figure 3.—Regional distribution of shrimp consumption (black) at home and population (white), 1969. Regions: 1, New England; 2, Middle Atlantic; 3, East North Central; 4, West North Central; 5, South Atlantic; 6, East South Central; 7, West South Central; 8, Mountain; 9, Pacific. (From Miller and Nash, Figure 11.)

number of households. The deviation exhibited by oysters is likely influenced by the geographic distribution of oyster consumption...oysters are heavily consumed in areas where they are produced. Family incomes in these areas generally are below national averages."

It should be noted, however, that the per capita shrimp consumption between income groups was over a fairly small range; that is, the well-to-do did not eat immensely larger quantities per capita

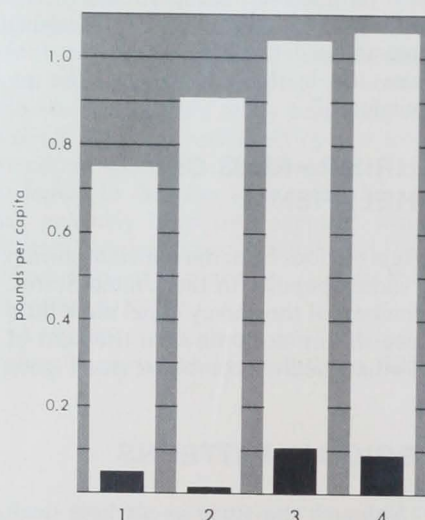


Figure 4.—Per capita consumption of clams (black) and shrimp (white), by family income. Family income: 1, under \$5,000; 2, \$5,000-6,999; 3, \$7,000-9,999; 4, \$10,000 and over. (From Miller and Nash, Figure 18.)

(Figure 4). The same situation did not obtain with clams, for example, where households earning more than \$7,000 consumed about three times as much clams per capita as did the less prosperous.

## AGE AND CONSUMER PREFERENCE

Shrimp differed from the other seafoods studied in that there were no sharply marked differences in preference by age group (Table 1).

Table 1.—Percentage distribution of seafood consumption at home by age of household head.<sup>1</sup>

	Age of household head		
	Under 35	35-44	45 and over
U.S. population	28%	22%	50%
Percent of total consumption:			
Shrimp	31	18	51
Oysters	20	8	72
Crabs	22	19	59
Lobsters	20	21	59
Clams	14	18	68
Scallops	13	17	70
Finfish	23	18	59
Canned fish	22	20	58

<sup>1</sup> Projected U.S. distribution based on per household consumption revealed in survey sample. (From Miller and Nash, Table 3).

"There were positive indications in the survey that older consumers are the more disposed toward consumption of fishery products. About 50 percent of households in the United States are headed by persons 45 years and older, yet this group, according to the survey, accounts for 72 percent of the oyster consumption, 68 percent of the clam consumption, and 70 percent of the scallop consumption, to cite several examples. On the other hand, the 28 percent of U.S. households headed by persons under 35 appear to consume only 20 percent of the oysters, 14 percent of the clams, and 13 percent of the scallops. Shrimp alone, among seven categories of seafood examined, exhibited an even distribution with respect to age of household head.

"Income may be a factor in the tendency for "older" households to consume more fishery products, assuming that higher incomes are associated with



older household heads. Nonetheless, the apparent even distribution of shrimp would seem to discount this contention. The simple conclusion thus is that young households are not consuming their proportional share of seafood products. Consequently, there is a generation of consumers growing up who are not developing the preferences for seafood products exhibited by persons in the older age brackets. In brief, the lines of tradition in seafood consumption are being broken. Producers would do well, therefore, to pay heed to this apparent trend and direct their marketing efforts accordingly."

After its publication, the Miller-Nash study was criticized on technical statistical grounds which indicated that some of the findings, notably the proportions between the amounts of seafoods eaten at home and consumed outside the homes might be subject to substantial errors, and that authors have admitted that the criticisms may have merit. No one, however, has objected to the principal conclusions, and those answer the question that is the title of this article. Who eats shrimp? The answer, according to the survey, seems to be—just about everybody: the young, the old, the rich, the poor, people who live in the shrimping ports of the Gulf and those who are a lot more familiar with roping cattle than catching marine fish.

These conclusions should not be misconstrued to suggest that shrimp plays any large part in the diets of the households sampled, of course. If one assumed that the 1,500 housewives visited the supermarket once a week, then they had 78,000 opportunities to purchase fresh or frozen shrimp. They did so only 2,575 times: on the average, only 3.3 percent of the time did their weekly shopping list include shrimp. That means less than twice a year. (They paid, in 1969, a nostalgic average of \$1.35 a pound for the shrimp they bought.)

The universality of the appeal of shrimp, however, as indicated by Miller and Nash, has been borne out, of course, by increasingly higher consumption figures since 1969, the year of the survey.

T.A.M.

## Shellfish Shells Salvaged For Commercial Use

The shells of shellfish, long considered waste by the seafood industry, are being salvaged to produce a cellulose-like substance of commercial value to a variety of industries.

Chitin (pronounced "kite-n") and its derivative, chitosan, are being produced at a small pilot plant on the outskirts of Seattle, Washington, and offered to researchers who have already identified scores of known and potential uses for the product, according to the Commerce Department's National Oceanic and Atmospheric Administration. Some of the uses of chitin and chitosan are:

- As a papermaking additive to improve the wet-strength properties of newsprint (the paper on which newspapers are published) and other paper;

- As an additive to baby food formulations;

- As a coagulant in the treatment of water supplies, sewage, and waste water;

- As an additive to stomach antiacids;

- In the treatment of wounds;

- For controlled, long-term release of herbicides and insecticides;

- In textile finishes;

- In water-base paint emulsions;

- As a new synthetic fiber;

- As a food thickener;

- In the manufacture of films; and

- In the manufacture of specialty adhesives.

The chitin-chitosan plant, operated by Food, Chemical, and Research Laboratories, Inc., of Seattle, was built in response to growing demands for alternate methods for the disposal of the thousands of tons of lobster, shrimp, and crab carcasses annually dumped in ocean and near-shore regions, a pollution problem as such material is highly resistant to biodegradation. In many areas, small seafood processors may be forced out of business as environmental regulations prohibit the dumping of un-

treated shellfish wastes into coastal waters.

Recognizing that this situation threatens the existence of an important segment of the food industry, NOAA's Office of Sea Grant provided support to a research program at the University of Washington and sought other ways to develop economically sound ways of utilizing waste products from marine food processing plants. The chitin-chitosan program is an important part of this venture.

Basically, chitin is the structural material that holds together the shells of crustacea such as crab, shrimp, lobster, and crayfish. (Other arthropods synthesize this polymer as an important component of their exoskeleton, too. Most of the 800,000 known insect species, in fact, rely upon chitin to give them structural support and protection from the environment.)

At the Seattle plant, the leg shells of Alaskan King Crabs and local Dungeness Crab are processed for chitin. This process is linked to another process which produces fish protein concentrate. This sister process, developed through the University of Washington Sea Grant Program, complements the chitin process and vice-versa, extracting the protein from the residues and leaving a dry shell. Together, the processes totally utilize fish and shell wastes introduced to the plant.

Operating at full capacity, the plant can produce about a ton of chitin each month. Food, Chemical, and Research Laboratories, Inc., is considering a second, larger plant.

NOAA has guaranteed the pilot plant a market by purchasing \$48,000 worth of chitin and chitosan during 1972-1974. These materials are distributed for the Sea Grant Program through the Oceanographic Institute of Washington on request to researchers throughout the country who are studying the uses of chitin and chitosan in new products and markets.

The pilot plant in Seattle, according to NOAA officials, may be the prototype for a fledgling chitin/chitosan industry, providing a practical and profitable use for the 75 to 83 percent "waste" found in most species of shellfish.

Source: U.S. Department of Commerce News, NOAA 73-14.